

Application No. 10/828,684
Amendment Dated April 24, 2007
Reply to Office Action of March 13, 2007

REMARKS

The Office Action mailed March 13, 2007 has been carefully considered by Applicant.

The abstract has been amended to overcome the Examiner's objection. No new matter has been added by this amendment.

The Examiner indicated that references A4, A6, and A8 of the IDS filed by the Applicant on March 8, 2007 were not considered as the sources were not scanned and could not be located from the corresponding web addresses. Submitted along with this Response is a resubmission of references A4, A6, and A8 under 37 C.F.R. §1.97(c), along with the required fee for submission after the first Office Action. The Examiner is requested to consider these references along with the present response.

Claim Rejections Under 35 U.S.C. §103

Claims 1-7, 9-13, 15-21, 23-25, 26-29 and 31-34 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Roehrig et al. U.S. Patent Application No. 2002/0097902 in view of Rogers U.S. Patent No. 6,970,587. By the present amendment, claims 1, 3, 5-7, 10, 11, 16, 18, 20, 24-27, 29 and 31-34 have been amended to more clearly recite the subject matter of the present invention and render the claims allowable over the cited references. Furthermore, claims 2, 4, 9, 12, 13, 15, 17, 19, and 28 have been cancelled and claims 35-46 have been added.

Claim 8, 14, 22, and 30 have been rejected under 35 U.S.C. §103(a) as being unpatentable over the combination of Roehrig et al. and Rogers references in further view of Ozaki U.S. Application Publication No. 2006/0050943. By the present amendment, claims 8, 22, and 30 have been cancelled rendering the rejection of these claims moot.

Claim 1

Presently amended claim 1 recites a method of displaying a number of computer-detected regions of pathological interest of an anatomical feature. The amended claim

now recites “simultaneously displaying with the image a uniquely identified marker corresponding to each computer-detected region of pathological interest,” and “displaying a second indication associated with each marker indicative of a classification of the region of pathological interest.” The Roehrig et al. and Rogers references fail to teach a uniquely identified marker. The Examiner points to paragraph 0064, lines 1-3 of the Roehrig reference, which discloses the display of a probability value adjacent to each region of interest on the annotation map. The probability values taught by the Roehrig reference generally correspond to the first indication required by claim 1. However, the display of a probability value, as taught by Roehrig, cannot be used to uniquely identify the regions of interest, as two or more regions of interest may have the same probability of being cancerous. The presently claimed uniquely identified marker is advantageous over the Roehrig reference such that the clinician may refer to and/or annotate the image of the anatomical feature with particular reference to one or more specific regions of pathological interest. The clinician is unable to do this with the systems and methods as disclosed in the Roehrig et al. reference.

In rejecting claim 1, the Examiner further relied upon the Rogers ‘587 patent in combination with the Roehrig reference. However, the Rogers ‘587 reference cited by the Examiner also does not teach or suggest the step of simultaneously displaying with the image a uniquely identified marker corresponding to each computer-detected region of pathological interest and further displaying a second indication associated with each marker where the second indication is indicative of a classification of the region of pathological interest. Instead, the Rogers reference teaches the ability of the radiologist to enter annotation information regarding suspicious areas on a patient image. These annotations can be placed at computer-identified areas on the image or at any location desired by the radiologist.

However, the Rogers reference, either alone or in combination with the Roehrig reference, does not teach or suggest, nor render obvious, the unique method required by amended independent claim 1. For the reasons set forth above, independent claim 1 is

Application No. 10/828,684
Amendment Dated April 24, 2007
Reply to Office Action of March 13, 2007

believed to be allowable over the combination of references cited by the Examiner. In light of the above distinctions, claim 1 is believed to be allowable and such action is respectfully requested.

Claims 3, 5, 6, 7, 35, and 37

Claims 3, 5, 6, 7, 35, and 37 all depend directly or indirectly from claim 1 and are thus believed allowable for the reasons stated above as well as the subject matter recited therein.

Claim 36

Newly presented claim 36 is dependent from presently amended claim 1 and states that the classification of the region of pathological interest is a physiological assessment of the region of pathological interest. The references cited by the Examiner do not teach of a marker depicting a visual indication of the classification of a region of pathological interest wherein the classification is a physical assessment of the region of pathological interest.

The Examiner has cited the Rogers reference at column 20, line 65 to column 21, line 2 as teaching a visual indication of a classification of a region of pathological interest. However, Rogers only teaches a visual indication on a marker on the image of the anatomical feature, wherein the visual indication identifies a suspicious location, such as taught at column 20 lines 57-61. A clinician identified suspicious location is not a physiological assessment of the region of interest as claimed in newly presented claim 36.

Furthermore, Rogers fails to teach of a marker with a visual indication of a physiological classification. The disclosed pull-down menus depicted in Figures 40 and 41 of the Rogers reference do not present the visual indication of the physiological classification as a part of the marker on the image of the anatomical feature. Therefore, the method as claimed in newly presented claim 36 is not taught by the combination of the Rogers and Roehrig references.

The method as claimed in claim 36 provides the advantage of presenting the clinician defined physiological classification of each region of interest by displaying only the image of the anatomical feature. Additional reference to other data fields outside of the image of the anatomical feature (as in Rogers) is not necessary for the clinician to interpret the image of the anatomical feature. This improves the efficiency of a clinician in interpreting an anatomical image. Therefore, the benefits of the method as presently claimed as well as the subject matter recited therein render claim 36 non-obvious over the Rogers and Roehrig references. Therefore, claim 36 is believed independently allowable. Such action is earnestly requested.

Claim 10

Presently amended independent claim 10 claims a method reciting “simultaneously displaying with the image a uniquely identified marker corresponding to each location of pathological interest,” “displaying a menu of user-selectable classification alternatives in response to the first user-input command, the classification alternatives representing physiological assessments of the region of pathological interest,” and “modifying the visual appearance of the displayed marker in response to the classification alternative selected by the user-input command.” Presently amended claim 10 is believed allowable over the combination of the cited Roehrig et al. and Rogers references, as both references fail to teach of “a uniquely identified marker corresponding to each location of pathological interest.” While the Examiner has cited the display of a numerical probability associated with each region of pathological interest as teaching the step of uniquely identifying each location of pathological interest, the display of a numerical probability fails to provide the unique identification as required by claim 10. The display of a numerical probability will not serve the purpose of uniquely identifying regions of interest that possess the same probability of being cancerous. Without a uniquely identified marker corresponding to each location of pathological interest, the systems and methods as disclosed in the Roehrig et al. and Rogers references limit a clinician’s ability

to reference and/or annotate an image of an anatomical feature by specific reference to one or more of the regions of pathological interest.

Additionally, the Roehrig et al. and Rogers references fail to teach displaying a menu of physiological assessment of the region of pathological interest and modifying the visual appearance of the displayed marker in response to the classification alternative selected by the second user input command. While the Rogers reference discloses a menu of user selectable physiological assessments of a region of pathological interest, Rogers fails to teach the modification of the visual appearance of the displayed marker in response to the classification alternative selected by the user. The resulting display disclosed in Rogers separates the physiological assessment from the image of the anatomical location such that the user must reference a data field or location outside of the image in order to view the physiological assessment. As such, the Rogers reference fails to teach the method as claimed in claim 10 and the combination of the Rogers and Roehrig references fails to render claim 10 obvious. As such, claim 10 is believed allowable.

Claims 11 and 38-40

Claims 11 and 38-40 depend directly from claim 10 and are thus believed allowable for the reasons stated above, as well as the subject matter recited therein.

Claim 16

Presently amended claim 16 claims a system for displaying a number of unique locations of pathological interest of an anatomical feature. The system comprises a processor coupled to the storage media operable to generate a uniquely identified marker corresponding to each computer-detected region of pathological interest. Upon receipt of a user selection of classification data, the processor modifies the visual display of the marker.

The Roehrig et al. and Rogers references cited by the Examiner fail to teach a system as claimed in presently amended claim 16 since neither of the references individually, nor in combination, disclose a processor first receiving a selection of classification data by the user and then using that classification data to modify the visual appearance of the uniquely identified marker. While the Rogers reference discloses a user selection of classification data at Col. 20, Ln. 65 to Col. 21, Ln. 8, these indications of classification fail to result in any modification of a marker associated with the region of pathological interest. While the Rogers reference discloses the modification of a marker associated with a region of physiological interest at Col. 20 Ln. 57-61 this is achieved by the mere toggling of the indicator of the suspiciousness of a region. Therefore, the Rogers reference fails to teach a processor modifying the visual appearance of a marker associated with a region of pathological interest due to a user selection of classification alternatives. As such, claim 16 is believed allowable. Such action is earnestly requested.

Claims 18, 20, 21, 23-25, 41 and 42

Claims 18, 20, 21, 23-25, 41 and 42 are all directly or indirectly depend from independent claim 16 and are thus believed allowable for the reasons stated above, as well as the subject matter recited therein.

Claim 26

Presently amended claim 26 claims a marker for use with a graphical user interface, where the marker uniquely identifies a location of pathological interest, includes a visual indication of the probability of cancer for the location of pathological interest, and further includes a visual indication of classification data based on user input. The cited Rogers and Roehrig et al. references fail to teach the marker as presently claimed in claim 26. Neither the Rogers reference nor the Roehrig et al. reference teach of a maker for identifying a location of pathological interest with a unique identifier for

that location of pathological interest. As stated above, the display of numerical probability as disclosed in the Rogers reference fails to provide a unique identification and such unique identification is desirable so that a clinician may annotate an image of an anatomical location with specific reference to one or more locations of pathological interest as identified by the uniquely identifying marker.

Furthermore, the Roehrig et al. and Rogers references fail to teach of a marker that displays both a visual indication of the probability of cancer and a visual indication of classification data based upon user input. The modification of the visual appearance of the marker as disclosed in the Rogers reference does not provide classification data as claimed in presently amended claim 26. Instead, the Rogers reference merely teaches the highlighting of the suspicious location with a marker. This highlighting of a location does not present a classification of the location of pathological interest, but rather highlights the location for further review.

In light of the above distinctions, claim 26 is believed allowable. Such action is earnestly requested.

Claim 27, 29, 31-34, 43 and 44

Claims 27, 29, 31-34, 43 and 44 all depend directly or indirectly from independent claim 26 and are thus believed allowable for the reasons stated above as well as the subject matter recited therein.

Claim 43

Claim 43 depends directly from claim 26 and is thus believed allowable for the reasons stated above as well as the subject matter recited therein. More specifically, claim 43 recites that the classification data is a physiological assessment of the location of pathological interest. The highlighting of a location as suspicious, as taught by the Rogers reference at column 20 lines 57-61, does not provide a physiological assessment of the location of pathological interest as recited in claim 43. The marker as claimed in

claim 43 holds the purpose of being used in the annotation of an anatomical image. The highlighting of a specific location as disclosed by the Rogers reference does not provide a physiological assessment as to the location of pathological interest. Rather, the Rogers reference teaches of indicating a pathological assessment of the location of pathological interest using a separate pull-down menu that is separate from the anatomical image. The selection of a physiological assessment by a clinician utilizing the system and method as disclosed by the Rogers reference does not result in the visual modification of any of the markers of the locations of pathological interest to reflect a selection of a pathological assessment of that location. Therefore, the Rogers and Roehrig et al. references fail to teach the marker as claimed in claim 43. As such, claim 43 is believed independently allowable.

Claim 46

Newly presented claim 46 depends indirectly from independent claim 26 and is thus believed allowable for the reasons stated above as well as the subject matter recited therein. More specifically, claim 46 recites a menu of alternative classifications comprising at least one physiological assessment of the location of pathological interest and at least one clinical assessment of the location of pathological interest. According to the disclosure of the Rogers reference, a clinician must select an identification of a physiological assessment of a location of a pathological interest using an independent menu from which the clinician may select clinical assessments of the location of pathological interest. The clinician may identify a location as being “suspicious” or as a false positive by selecting a marker and executing an input command. However, if the clinician desires to provide a physiological assessment of the location of pathological interest, the clinician must select the marker and then utilize a separate pull-down menu to identify a physiological assessment. The selection of a physiological assessment does not result in the visual modification of the marker associated with that location. Therefore, the clinician must use three or more menu locations and/or user inputs to select

a physiological or a clinical assessment of the location of pathological interest. As claimed in newly presented claim 46, the user is presented with a menu that comprises physiological assessment and clinical assessment options from which the user may select to indicate the classification data to be visually displayed by the marker. This simplifies the user interface and allows for the user to more efficiently annotate the anatomical images being reviewed. In light of the above distinctions, claim 46 is believed independently allowable. Such action is earnestly requested.

Claim 14

Claim 14 depends from independent claim 10 and is thus believed allowable for the reasons stated above as well as the subject matter recited therein. More specifically, claim 14 recites changing the color of the displayed marker as modifying the visual appearance of the displayed marker in response to the classification alternative selected by the user-input. It would not have been obvious for one of ordinary skill in the art to combine the Ozaki reference with the Roger and Roehrig et al. references. While all three references relate to the field of computer-aided detection, the Rogers and Roehrig et al. references, as well as the present application, relate to the annotation of the images resulting from the use of a computer-aided detection system, while the Ozaki reference is directed towards a computer-aided detection system itself. Therefore, one skilled in the art would not apply techniques utilized in the automated computer aided detection analysis of an anatomical image to the techniques of providing a system for a user to annotate the results of a computer-aided detection system. As such, there is no motivation to combine the Ozaki reference with the Roehrig et al. and Rogers references.

Furthermore, the Ozaki reference at paragraph 90 as cited by the Examiner discloses the use of different colors to indicate computer identified locations of pathological interest that were identified using different algorithm directed towards the identification of different pathologies. This does not teach the limitation as claimed in claim 14 wherein the color of marker of a location of pathological interest is modified in

Application No. 10/828,684
Amendment Dated April 24, 2007
Reply to Office Action of March 13, 2007

response to a user selection of a classification for the location of pathological interest. Therefore, claim 14 is believed allowable over the cited combination of the Rogers, Roehrig et al. and Ozaki references. Such action is earnestly requested.

Conclusion

The present application is thus believed in condition for allowance with claims 1, 3, 5-7, 10, 11, 14, 16, 18, 20, 21, 23-27, 29 and 31-46. Such action is earnestly requested.

Respectfully submitted,

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